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ABSTRACT

This is the teacher's edition of the Record Book for the unit "Well-Being" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the student text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and excursions. A self evaluation section is followed by its answer key. (SA)

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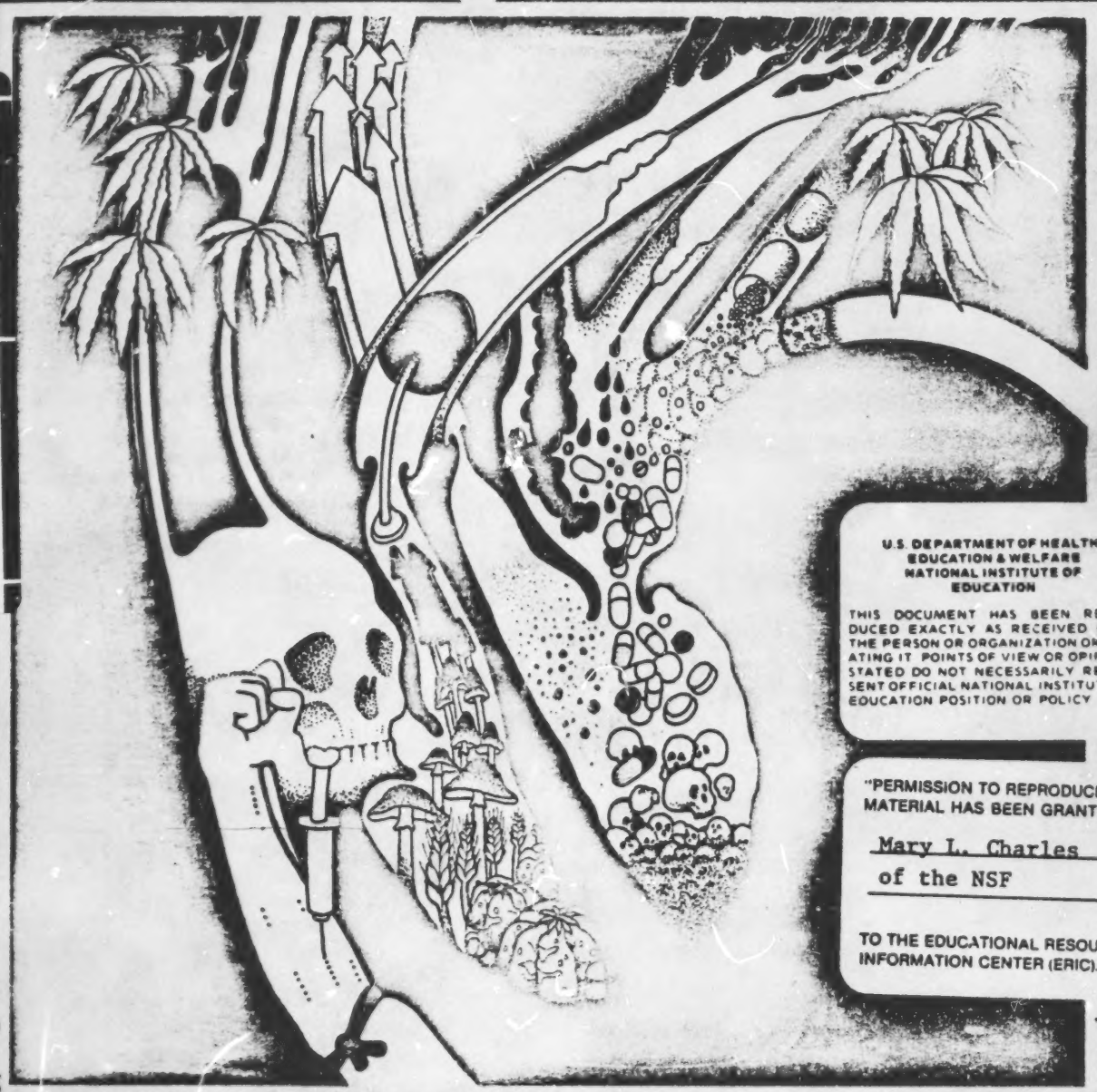
Record Book

TEACHER'S EDITION

Well-Being



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INTERMEDIATE SCIENCE CURRICULUM STUDY TEACHER'S EDITION

Record Book

Well-Being

Probing the Natural World / Level III

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ISCS PROGRAM

LEVEL I
Probing the Natural World / Volume 1 / with Teacher's Edition
Student Record Book / Volume 1 / with Teacher's Edition
Master Set of Equipment / Volume 1
Test Resource Booklet

LEVEL II
Probing the Natural World / Volume 2 / with Teacher's Edition
Record Book / Volume 2 / with Teacher's Edition
Master Set of Equipment / Volume 2
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LEVEL III
Why You're You / with Teacher's Edition
Record Book / with Teacher's Edition / **Master Set of Equipment**
Environmental Science / with Teacher's Edition
Record Book / with Teacher's Edition / **Master Set of Equipment**
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Record Book / with Teacher's Edition / **Master Set of Equipment**
In Orbit / with Teacher's Edition,
Record Book / with Teacher's Edition / **Master Set of Equipment**
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Foreword

A pupil's experiences between the ages of 11 and 16 probably shape his ultimate view of science and of the natural world. During these years most youngsters become more adept at thinking conceptually. Since concepts are at the heart of science, this is the age at which most students first gain the ability to study science in a really organized way. Here, too, the commitment for or against science as an interest or a vocation is often made.

Paradoxically, the students at this critical age have been the ones least affected by the recent effort to produce new science instructional materials. Despite a number of commendable efforts to improve the situation, the middle years stand today as a comparatively weak link in science education between the rapidly changing elementary curriculum and the recently revitalized high school science courses. This volume and its accompanying materials represent one attempt to provide a sound approach to instruction for this relatively uncharted level.

At the outset the organizers of the ISCS Project decided that it would be shortsighted and unwise to try to fill the gap in middle school science education by simply writing another textbook. We chose instead to challenge some of the most firmly established concepts about how to teach and just what science material can and should be taught to adolescents. The ISCS staff have tended to mistrust what authorities believe about schools, teachers, children, and teaching until we have had the chance to test these assumptions in actual classrooms with real children. As conflicts have arisen, our policy has been to rely more upon what we saw happening in the schools than upon what authorities said could or would happen. It is largely because of this policy that the ISCS materials represent a substantial departure from the norm.

The primary difference between the ISCS program and more conventional approaches is the fact that it allows each student to travel

at his own pace, and it permits the scope and sequence of instruction to vary with his interests, abilities, and background. The ISCS writers have systematically tried to give the student more of a role in deciding what he should study next and how soon he should study it. When the materials are used as intended, the ISCS teacher serves more as a "task easer" than a "task master." It is his job to help the student answer the questions that arise from his own study rather than to try to anticipate and package what the student needs to know.

There is nothing radically new in the ISCS approach to instruction. Outstanding teachers from Socrates to Mark Hopkins have stressed the need to personalize education. ISCS has tried to do something more than pay lip service to this goal. ISCS' major contribution has been to design a system whereby an average teacher, operating under normal constraints, in an ordinary classroom with ordinary children, can indeed give maximum attention to each student's progress.

The development of the ISCS material has been a group effort from the outset. It began in 1962, when outstanding educators met to decide what might be done to improve middle-grade science teaching. The recommendations of these conferences were converted into a tentative plan for a set of instructional materials by a small group of Florida State University faculty members. Small-scale writing sessions conducted on the Florida State campus during 1964 and 1965 resulted in pilot curriculum materials that were tested in selected Florida schools during the 1965–66 school year. All this preliminary work was supported by funds generously provided by The Florida State University.

In June of 1966, financial support was provided by the United States Office of Education, and the preliminary effort was formalized into the ISCS Project. Later, the National Science Foundation made several additional grants in support of the ISCS effort.

The first draft of these materials was produced in 1968, during a summer writing conference. The conferees were scientists, science educators, and junior high school teachers drawn from all over the United States. The original materials have been revised three times prior to their publication in this volume. More than 150 writers have contributed to the materials, and more than 180,000 children, in 46 states, have been involved in their field testing.

We sincerely hope that the teachers and students who will use this material will find that the great amount of time, money, and effort that has gone into its development has been worthwhile.

Tallahassee, Florida
February 1972

The Directors
INTERMEDIATE SCIENCE CURRICULUM STUDY

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Notes to the Student

This Record Book is where you should write your answers. Try to fill in the answer to each question as you come to it. If the lines are not long enough for your answers, use the margin, too.

Fill in the blank tables with the data from your experiments. And use the grids to plot your graphs. Naturally, the answers depend on what has come before in the particular chapter or excursion. Do your reading in the textbook and use this book only for writing down your answers.

Notes to the Teacher

In almost every instance, variable answers are of a quantitative nature and are based on measurements the students themselves make. In these cases, other answers may also be accepted.

Table 1-2

Day 1	Type of Activity	Time Spent on This Activity (in hours)
	Sleeping	
	Not active	
	Light activity	
	Moderate activity	
	Strenuous activity	
Day 2	Type of Activity	Time Spent on This Activity (in hours)
	Sleeping	
	Not active	
	Light activity	
	Moderate activity	
	Strenuous activity	

Day 3	Type of Activity	Time Spent on This Activity (in hours)
	Sleeping	
	Not active	
	Light activity	
	Moderate activity	
	Strenuous activity	

Day 4	Type of Activity	Time Spent on This Activity (in hours)
	Sleeping	
	Not active	
	Light activity	
	Moderate activity	
	Strenuous activity	

Day 5	Type of Activity	Time Spent on This Activity (in hours)
	Sleeping	
	Not active	
	Light activity	
	Moderate activity	
	Strenuous activity	

☐1-1. It bent upward.

☐1-2. It went out.

☐1-3. As the strip cooled, it bent downward, making contact with the wire, and the bulb lit again.

☐1-4. The nichrome coil that heats up

☐1-5. The bulb when it lights up

☐1-6. By breaking the contact and opening the circuit

☐1-7. By making contact with the wire and completing the circuit

☐1-8. The bimetal strip, by how much the heat bends it

☐1-9. (Depends on classroom conditions; usually around 70°F, or 21°C)

☐1-10. (Depends on individual thermostat; usually around 2°F, or 1.1°C)

☐1-11. Electrical

☐1-12. (Student describes observations; should see pupils close as light increases, open as light decreases.)

☐1-13. (The student may guess that the message is electrical, chemical, or a nerve signal.)

☐1-14. The response is in the opposite direction to the stimulus; when the food supply is down, the appetite goes up.

☐1-15. (Answer depends on student weight; for a 150-lb student—about 68,000 grams—it would be 68,000 calories or 68 Calories.)

☐1-16. (Answer varies with student, but should be weight in lb × 454 gm./lb.)

☐1-17. (Answer varies with student.)

☐1-18. Boys need more. .

☐1-19. Girls need fewer.

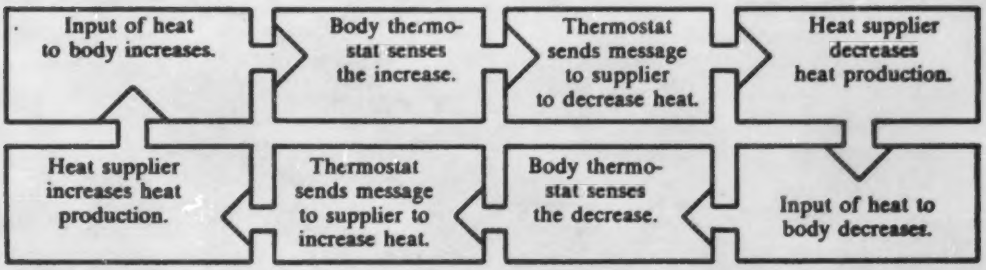
☐1-20. (Normally 98°–99°F, or 37°C)

☐1-21. (Depends on student.)

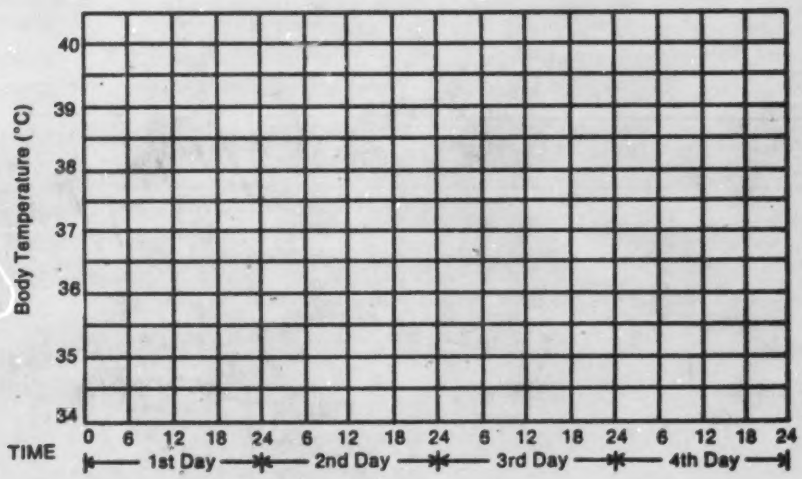
☐1-22. (Varies with room and student temperatures.)

☐1-23. More

☐1-24.


Input of heat to body increases.
Body thermostat senses the increase.
Thermostat sends message to supplier to decrease heat.
Heat supplier decreases heat production.
Input of heat to body decreases.
Body thermostat senses the decrease.
Thermostat sends message to supplier to increase heat.
Heat supplier increases heat production.

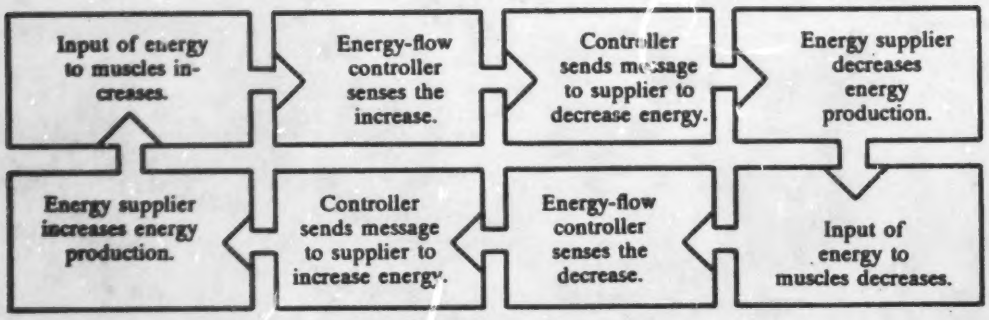
Problem Break 1-2, Figure 1-9



☐1-25. (Varies with student.)

☐1-26. (Varies with student averages.)

☐**1-27.**


Input of energy to muscles increases.
Energy-flow controller senses the increase.
Controller sends message to supplier to decrease energy.
Energy supplier decreases energy production.
Input of energy to muscles decreases.
Energy-flow controller senses the decrease.
Controller sends message to supplier to increase energy.
Energy supplier increases energy production.

☐**1-28.** It should increase.

☐**1-29.** It should decrease.

☐**1-30.** It should increase.

☐**1-31.** They are probably less active than when they were young.

☐**1-32.** Eat less and be more active.

☐**1-33.** 35,000 Calories

☐**1-34.** 1,200 Calories/day; 29 or 30 days

Problem Break 1-3

Table 1-4

	Daily Calorie Input	Daily Calorie Output	Difference
Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Average			

☐1-35. (Varies with student.)

☐1-36. (Varies with student.)

☐1-37. Either Yes or No depending on student

☐1-38. Some of the following: diabetes, kidney diseases, atherosclerosis, heart diseases, shortness of breath

☐1-39. Slightly underweight

Problem Break 1-4 (Optional)
Procedures:

Diet:

Results:

Problem Break 2-1
Hypothesis:

Procedure:

Observations:

Chapter 2
Where There's Smoke, There's Fire

Conclusions:

☐2-1. It controls the production of mucus and the movement of cilia.

☐2-2. It helps to control the buildup of dust and particles in the lungs.

☐2-3. There is an increase in goblet cells and basal cells, with a corresponding decrease in ciliated cells, in Figure 2-3.

☐2-4. The cell production rate for basal cells must have increased.

☐2-5. The cell production regulator sent a message to the cell production controller to speed up production, which it did.

☐2-6. More mucus would be produced. Also, they would crowd out the ciliated cells.

☐2-7. The mucus and foreign matter would not be pushed into the nose and mouth for removal.

☐2-8. There is a direct relationship between coughs and other respiratory ailments and smoking.

☐2-9. The air sacs have broken down and enlarged.

☐2-10. It would be likely to make breathing more difficult.

☐2-11.a. There is a direct relationship between amount of smoking and thickening of epithelium.

b. There is a direct relationship between amount of smoking and the presence of abnormal cells.

Problem Break 2-2

(1) Comparison of pulse and breathing rates of smokers and nonsmokers, (2) effect of exercise, and (3) time to return to normal after exercise.
Procedure:

Data:

Conclusions:

☐**2-12.** (Answers depend on data collected.)

Problem Break 2-3
Fingertip temperature of smokers and nonsmokers.
Observations:

Conclusions:

☐2-13. Going down

☐2-14. Lung cancer, cancer except lung cancer, heart and circulatory diseases

☐2-15. About 60,000 males; about 11,000 females

Problem Break 2-4

☐2-16. More than 4,300

☐2-17. (Answers will vary, but in order to extrapolate to 1970, you must assume that the trend will continue as the data indicate, and that other factors were not introduced to affect the data.)

☐2-18. No. It shows a relationship between smoking and lung cancer, but it doesn't prove it.

☐**2-19.** Figure 2-12 shows a direct relationship between incidence of lung cancer and number of cigarettes smoked. But Figures 2-10 and 2-11 give no information on number smoked.

Table 2-6

Amount Smoked	Risk of Getting Lung Cancer Compared to "Never Smoked"
Less than ½ pack daily	4.7 times greater risk
½ to 1 pack daily	_____ times greater risk
1 to 2 packs daily	_____ times greater risk
More than 2 packs daily	_____ times greater risk

Problem Break 2-5

Problem Break 2-6

Problem Break 2-7

☐2-20. It increases.

☐2-21. Pipe

☐2-22. As smoking increases, the amount of CO breathed out increases.

☐2-23. As inhaling increases, the amount of CO breathed out increases.

☐2-24. (Answers will vary; a possible explanation is that pipe and cigar smokers inhale less.)

☐**2-25.** CO in the blood keeps the red blood cells from carrying oxygen. The body could suffer from too little oxygen being carried to the cells.

☐**2-26.** Yes

☐**2-27.** (Answers will vary. Possible ways might include annoyance from smoke, ashes spilled, starting fires, smell of tobacco, burning holes in clothes.)

☐**2-28.** (Possible answers might be a poorer start in life, or less resistance to illness. But another possible answer is that it would make the birth easier for the mother.)

☐**2-29.** (Answers will vary. Possibly students will explain it on the basis of a feedback system between mother and child.)

☐**2-30.** (Answers will vary. Factors may include economics, personal rights, employment.)

☐**2-31.** No (The results may show a relationship.)

☐**2-32.** No; many more tests than this would have to be made.

☐**2-33.** Association

Chapter 3 Chemicals and Your Body

☐**3-1.** No (or possibly "restlessness")

☐**3-2.** Physical dependence is indicated by the presence of withdrawal illness upon stopping the use of a drug. The greater the dependence, the stronger the symptoms.

☐3-3. Psychological dependence is measured by the mental craving for a drug.

☐3-4. Physical dependence is the effect of the body getting used to a drug. Sudden stopping brings on withdrawal illness. Psychological dependence is addiction, and causes mental craving for the drug.

☐3-5. Smoking is not addictive; no irresistible craving is present, so it is not a case of psychological dependency. There may be some relatively mild withdrawal symptoms on stopping, so it can cause physical dependency. But mostly it is just a habit.

☐3-6. Chemical, electrical, nerve impulse (accept any answer.)

☐3-7. Chemical and electrical

☐3-8. The pupil might not close down; or the light stat would have to release a lot more "shut down" chemical to try to overcome the "open up" chemical injected into the body.

☐3-9. (Answers will vary.)

Chapter 4 You're Down Before You're Up

☐4-1. (Students summarize Table 4-2 in their own words.)

☐4-2. The ability to stop in a shorter distance may prevent an accident.

☐4-3. (Discussions will vary. Some students may feel that 0.10% is too high because there is 8 times as much chance of an accident at that point. Some may feel that it is too low because Table 4-2 seems to indicate that physical impairment begins at 0.12%.)

☐4-4. 4 times; 8 times; 25 times

☐4-5. 45 minutes ($\frac{3}{4}$ hour)

☐4-6. The effect began immediately and lasted for $2\frac{1}{2}$ hours.

☐4-7. (List should include some of the following: age, weight, size, physical condition, how much it was diluted, what it was mixed with, kind and amount of food in stomach, speed of elimination from body, body tolerance, effects of other drugs.)

☐4-8. Heavy people have more blood vessels (and blood) and therefore the blood-alcohol level is lower for a particular amount of alcohol consumed.

☐4-9. A depressant is a substance that slows down body activity a measurable amount.

☐4-10. Useful: relieve pain, lessen nervousness, induce sleep, control undesirable behavior, control high blood pressure, treat epilepsy, stop coughing.

Dangerous: lower blood pressure too far, decrease body resistance to disease, cause unclear speech and loss of coordination, slow reactions, harm ability to think clearly, destroy concentration, cause loss of control of emotions, cause physical and psychological dependence, cause stupor or death when two are used together.

Chapter 5 Wake Up and See Things

☐5-1. Predictions should include some of following: increase pulse, increase breathing rate, increase blood pressure, pep you up, wake you up, make you less tired, make you eat less, slow reflexes.

☐5-2. Predictions may include some of following: make you nervous, excitable, uptight; affect your judgment; make you behave erratically; make you violent.

☐5-3. No. It is not a closed loop; the stimulus change and response change are not necessarily opposite; different stimuli are being used from outside the body.

Problem Break 5-1

Hypothesis: Students who drink coffee (or tea) will do more poorly on a school test than students who do not drink coffee (or tea).

Procedures:

Data:

Conclusions:

☐5-4. Possible symptoms could include these: wide-open eye pupils, dry mouth, sweating, headache, loss of appetite, paleness. Also: talkative, sleepless, uninhibited in behavior, confused, violent.

☐5-5. The definition should include a *change* in a behavior or an appearance listed in 5-4, with a method of measuring the amount of change.

☐5-6. Bothered by

☐5-7. Because normal heart rate varies from person to person.

☐5-8. Mostly increased

☐5-9. Regular users

☐5-10. From −8 to +28 (36 beats)

☐5-11. On the theory that they would have built up a tolerance, and a low dose would have had little effect.

☐5-12. Stimulant

☐5-13. Numbers 3, 7 and 8 (But if "problems" is used broadly, also numbers 4, 5, 6.)

☐5-14. (Predictions will vary, but students might predict that heavy users are pleasure-seekers, light users have trouble socializing—are introverts.)

☐5-15. Marijuana lessened driving ability in most cases.

☐5-16. LSD seems to change the way a person perceives things; it also seems to make things unreal.

☐5-17. Not in all cases

☐5-18. Six or more hours

☐5-19. Yes

☐5-20. (Student interests will vary. Possibly the effects on taste, smell, touch, manual dexterity, coordination, test scores, concentration, problem solving, etc.)

☐5-21. New users; new users

☐5-22. Higher dosage gave lower score.

☐5-23. New users: no for low dose, yes for high dose. Regular users: yes (for high dose).

☐5-24. New users did less well.

☐5-25. Regular users did better.

☐5-26. There seems to be a relationship between LSD usage and chromosome damage, both to users and to unborn infants of users.

☐5-27. (Possibly the person might exhibit some of the following: anxiety, dizziness, dreaminess, euphoria, nausea, dilated pupils, chills, unreasonable behavior, distorted senses.)

☐5-28. A hallucinogenic drug is one that causes a measurable change (distortion) of the senses.

Chapter 6 Should It Be Against the Law?

Problem Break 6-1

☐**6-1.** No. Aspirin is a drug with proven effects on pain and fever.

☐**6-2.** The attitude of the doctor, in addition to the expectations of the patient

Problem Break 6-2

Questions: (1) What types of movies (if any) should young people be barred from seeing?

(2) Why did you answer question 1 as you did?

(Record sex, age level, and occupation of person with each response.)

Responses (at least 25):

Tabular Summary:

Feelings of People:

Rules for Movies:

☐ 6-3. (This calls for a student opinion.)

☐ 6-4. (Student answers will vary. Were the nine arguments as valid as the one or two?)

Excursions

Excursion 1-1
Big C and Little c

Table 1

MARSHMALLOWS					
Trial No.	No. of Mini-marshmallows	Mass of Water (grams)	Starting Temp. (°C)	Final Temp. (°C)	Change in Temp. (°C)
1	5	40			
2	5	40			
3	5	40			
			Average Temperature Change		

NUTS					
Trial No.	No. of Nuts	Mass of Water (grams)	Starting Temp. (°C)	Final Temp. (°C)	Change in Temp. (°C)
1	1	40			
2	1	40			
3	1	40			
			Average Temperature Change		

☐1. No

☐2. (Answers will vary.)

☐3. (Answers will vary.)

☐4. 4.2 Calories

☐5. 1 Calorie (or 1,000 calories)

Excursion 1-2 Counting Calories

☐1. Fats

☐2. Fats

Excursion 1-3 Activities and Calories

Table 1

Activity	Rounded Time (in hours)	Calories Used (per pound of body weight per hr)	Body Weight (in pounds)	Calories Used
Bicycling (fast)		3.4		
Bicycling (slow)		1.1		
Dishwashing		0.5		
Dressing and undressing		0.3		
Eating		0.2		
Playing Ping-Pong		2.0		
Running		3.3		
Sitting quietly		0.2		
Sleeping		0.2		
Standing		0.2		

Studying or writing		0.2		
Swimming		3.6		
Tennis		3.0		
Typewriting rapidly		0.5		
Violin playing		0.3		
Volleyball		2.5		
Walking		0.9		
Work, heavy		2.6		
Work, light		1.0		
			Total Calories Used per Day	

Excursion 2-1 How Are You Organized?

☐1. (Sketch of cell) (optional)

☐2. Onion cells

☐3. Both have nuclei; both have granules inside.

☐4. 1, 2, 3, 4

☐5. (Lists will vary.)

☐6. Lists may include, but not be limited to, the following organs.

Respiratory System	Digestive System
Mouth	Mouth
Nose	Tongue
Throat	Throat
Trachea	Esophagus
Bronchi	Stomach
Lungs	Pyloric valve
Alveoli	Small intestine
	Large intestine

Problem Break 1

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

Excursion 2-2 Ask Me the Right Question

☐1. Ask the same questions, in the same order, under the same conditions.

☐2. Advantages of reading: Sure to be the same; no hesitation; keeps order straight

Disadvantages of reading: Sounds too "cut and dried"; makes person hesitant to answer

Advantages to memorizing: Seems more spontaneous; makes person more willing to answer

Disadvantages to memorizing: Difficult and time-consuming, especially if long, danger of forgetting

☐3. (Answers will vary.)

Excursion 2-3
The Round-and-Round System

☐1. Walls of the ventricles

☐2. Wall of the left ventricle

☐3. The left ventricle must pump the blood farther than the right ventricle pumps it.

☐4. Arteries

☐5. Veins

☐6. Capillaries

Excursion 5-1
Is It Really There?

☐1. Same

☐2. Same

☐3. Same

☐4. Same

☐5. (Answers may include the following: comparisons of areas distort lengths; placement of lines changes apparent lengths; perspective; angular figures give incorrect length impressions. You will probably want to accept any answers.)

☐6. Gray spots

☐7. An illusion

☐8. (Report will vary with student. The delusions most commonly reported are very similar to the ones that schizophrenic patients have—animal fantasies, witches in disguise, demons that pursue the person; he believes there are conspiracies, plots, and schemes working against him.)

Excursion 5-2
The DSST

☐1. (Report of partner's score)

☐2. (Report of student's score)

☐3. Matching ability (or speed or reaction time)

Problem Break 1

Reasons for changes in scores on DSST by marijuana users:

☐1. Stimulant

☐2. Stimulant

☐3. Slightly faster

☐4. Slower

☐5. (Answers will vary. Students may suggest a measurement of breathing rate, or the use of a different type of test.)

☐6. Smoked marijuana; marijuana capsule and alcohol; alcohol; smoked marijuana

☐7. Smoked marijuana greater in three categories, marijuana capsule greater in one category

☐8. 12; 37.5%

☐9. (Answers will vary, but they should include the necessity of data on alcohol aftereffects.)

☐10. There is a definite relationship between drunkenness and crimes of violence.

☐11. (Student conclusions will vary, but they should sum up the data on DSST, time estimation, heartbeats, and effects.)

How Well Am I Doing?

You probably wonder what you are expected to learn in this science course. You would like to know how well you are doing. This section of the book will help you find out. It contains a Self-Evaluation for each chapter. If you can answer all the questions, you're doing very well.

The Self-Evaluations are for your benefit. Your teacher will not use the results to give you a grade. Instead, you will grade yourself, since you are able to check your own answers as you go along.

Here's how to use the Self-Evaluations. When you finish a chapter, take the Self-Evaluation for that chapter. After answering the questions, turn to the Answer Key that is at the end of this section. The Answer Key will tell you whether your answers were right or wrong.

Some questions can be answered in more than one way. Your answers to these questions may not quite agree with those in the Answer Key. If you miss a question, review the material upon which it was based before going on to the next chapter. Page references are frequently included in the Answer Key to help you review.

On the next to last page of this booklet, there is a grid, which you can use to keep a record of your own progress.

Notes for the Teacher

The following sets of questions have been designed for self-evaluation by your students. The intent of the self-evaluation questions is to inform the student of his progress. The answers are provided for the students to give them positive reinforcement. For this reason it is important that each student be allowed to answer these questions without feeling the pressures normally associated with testing. We ask that you do not grade the student on any of the chapter self-evaluation questions or in any way make him feel that this is a comparative device.

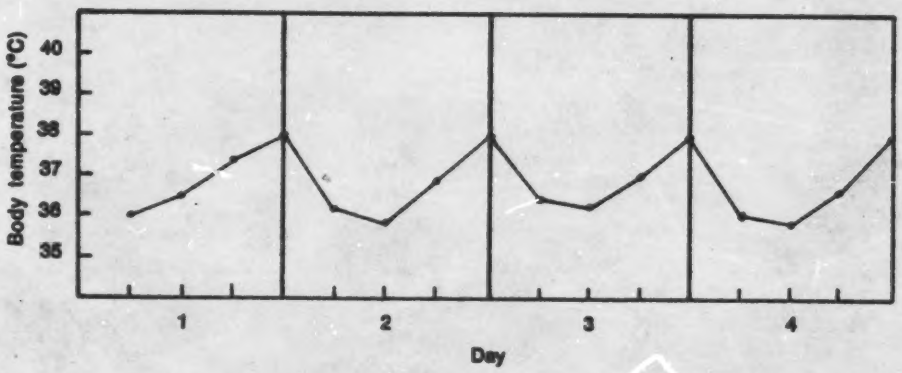
The student should answer the questions for each chapter as soon as he finishes the chapter. After answering the questions, he should check his answers immediately by referring to the appropriate set of answers in the back of his Student Record Book.

There are some questions that require planning or assistance from the classroom teacher or aide. Instructions for these are listed in color on the pages that follow. You should check this list carefully, noting any item that may require your presence or preparation. Only items which require some planning or assistance are listed.

You should check occasionally to see if your students are completing the progress chart on page 53.

Circle any of the excursions for this chapter that you completed. **SELF-EVALUATION 1**
1-1; 1-2; 1-3; 1-4

☐**1-1.** Use the graph below to answer the questions that follow.



a. Based on the above graph, what is the set point for the person's body temperature?_____

b. At about what temperature does this person's "body thermostat" turn on the body's heat supplier?_____

c. Which of the following is not a "normal" temperature for this person: 37°C; 39°C; 38°C; 36°C?_____

☐**1-2.** State an operational definition for the term *calorie.*

_____

_____

☐**1-3.** What is the relationship between a calorie and a Calorie?

_____

☐**1-4.** How many calories of heat would it take to warm up 40 grams of water from 12°C to 19°C?

_____

☐**1-5.** What two things will determine whether you gain or lose weight over a period of time?

a. _____

b. _____

☐**1-6.** In order to have a good diet, you need other inputs to your body besides Calories. Name two of these other inputs.

_____

☐**1-7.** A boy who is 15 years old and is 5 feet 6 inches tall weighs 140 lb. Use the table of weights given in **Excursion 1-4** to determine whether the boy is average, underweight, or overweight, and by how much. Record your conclusions below.

The boy is _____ for his age and size by ____ lb.

☐**1-8. a.** What is meant by the term *negative feedback system?*

_____

b. Give an example of a negative feedback system.

_____

☐**1-9.** Design an experiment that will show how many Calories an adult male rabbit needs to maintain its body weight. Keep in mind that you do not want to harm the rabbit.

_____

_____

_____

_____

Circle any of the excursions for this chapter that you completed.
2-1; 2-2; 2-3

☐**2-1.** A student wanted to investigate the effect of a solution of cigarette chemicals on the germination of corn seeds. He labeled two jars, one A and the other B. He placed four corn seeds and some tap water in jar A. In jar B he placed four corn seeds from the same package in the same amount of a solution of cigarette chemicals. After five days, all four corn seeds in jar A had produced seedlings. No seedlings had been formed in jar B.

a. Why did the student bother to use jar A with just tap water in it?

_____

_____

b. Can you conclude from this experiment that the cigarette chemicals in solution prevented the corn seeds from germinating? _____

Explain your answer. _____

_____

_____

☐**2-2.** Describe the effect that smoking seems to produce on each of the following.

a. Goblet cells _____

b. Ciliated cells _____

c. Air sacs _____

☐**2-3.** The death rate from lung cancer and the number of cigarettes smoked are both increasing at the same time. Do you think this is a cause-and-effect relationship or is it just a coincidence and not related?

_____

Explain your answer. _____

_____

_____

☐**2-4.** Some kinds of smoking seem to be more harmful to health than others. Put the following kinds of smoking in order from the most harmful to health to the least harmful to health.

Pipes
Cigarettes
Cigars

1. _____ (most harmful)
2. _____
3. _____ (least harmful)

☐**2-5.** What differences would you expect to find between smokers (one pack per day) and nonsmokers if you were to measure the following.

a. Heartbeat rate _____

b. Breathing rate while resting _____

c. Amount of CO in the exhaled air _____

☐**2-6.** Suppose you have a friend who smokes and has been smoking for several years. If he said that he is going to continue smoking because giving up smoking wouldn't do him any good now, what would you say to him?

_____

_____

_____

☐**2-7.** Congress has passed a law that forces cigarette manufacturers to put a warning of the danger to health on each pack of cigarettes. Why do you think Congress did not pass a law forbidding the manufacture or sale of cigarettes?

_____

_____

_____

_____

_____

☐2-8. Check the best answer. The evidence that cigarette smoking is harmful is

____ a. incomplete and more investigation is necessary.

____ b. biased and cannot be trusted.

____ c. conclusive and should be considered.

____ d. conclusive but not really relevant.

SELF-EVALUATION 3

☐3-1. Give an operational definition of physical dependence.

_____

_____

☐3-2. Give an operational definition of psychological dependence.

_____

_____

☐3-3. What is meant by a "cold turkey cure"?

_____

☐3-4. What are some characteristic symptoms of a withdrawal illness?

_____

_____

☐3-5. In what ways can a chemical introduced into the body disturb normal negative feedback systems?

_____

_____

_____

_____

_____

☐**3-6.** What are some of the things that a pregnant woman should consider before taking any drug?

SELF-EVALUATION 4

☐**4-1.** Describe the general effect of depressants on the body.

☐**4-2.** Why does alcohol enter the bloodstream much faster than foods do?

☐**4-3.** What are at least two things that might explain why the same amount of alcohol affects people differently?

☐**4-4.** What are two medical uses for depressants?

☐**4-5.** Why are doctors very careful to use sterilized (well-cleaned) needles when giving people injections of a drug?

☐**4-6.** How does the chance of having an automobile accident change when a person has had several drinks before driving?

☐**4-7.** Why is it very dangerous to take two or more drugs during the same period of time? (An example is drinking alcohol and then taking barbiturates.)

_____

_____

☐**4-8.** Codeine is a depressant that is found in some cough medicines. Do you think these cough medicines should be sold to the public without a doctor's prescription?

_____

Give reasons for your answer. _____

_____

☐**4-9.** Donald has been using heroin regularly for three months. He says that he can quit any time he wants.

a. Do you think he can? _____

b. Explain your answer. _____

_____

_____

c. What are some of the dangers other than the heroin itself that Donald faces?

_____

_____

_____

Circle any of the excursions for this chapter that you completed. **SELF-EVALUATION 5**
5-1; 5-2; 5-3; 5-4

☐**5-1.** What is the general effect of stimulants on the body?

_____

☐**5-2.** What are two psychological effects of stimulants?

_____

☐**5-3.** Why does a regular user of certain drugs require larger and larger doses of the drug to achieve the effects that he wants?

_____

_____

☐**5-4.** Give a definition of a hallucinogenic drug.

_____

_____

☐**5-5.** Some students sometimes take stimulants to stay awake and study the night before a test. Do you think this is a good idea?_____

Explain your answer._____

_____

_____

_____

_____

_____

☐**5-6.** What are some of the known physical effects of hallucinogenic drugs?

_____

_____

_____

_____

_____

☐**5-7.** Suppose you met someone with the following characteristics: pinpoint eye pupils, pale complexion, unclear speech, crying and sad, and in a dreamlike state.

Has the person taken a stimulant, or a depressant?_____

☐**5-8.** There are many arguments given for and against the legalization of marijuana. How would you vote and why?_____

_____

_____

_____

_____

☐**6-1. a.** What is a double-blind method of doing drug experiments? **SELF-EVALUATION 6**

_____

b. Explain why this method is necessary.

_____

_____

☐**6-2.** What are some of the reasons why laws are made?

_____

_____

_____

☐**6-3.** What are some of the reasons that some laws are more difficult to enforce than others?

_____

_____

_____

☐**6-4.** Why do you think the government was unable to stop the use of alcohol by passing laws to stop its production and sale?

☐**6-5.** Why do you think it is easier to pass laws prohibiting the manufacture, sale, or possession of certain drugs than to pass laws prohibiting the manufacture and sale of alcohol?

☐**6-6.** Suppose you were going to vote on a law to prohibit the manufacture and sale of cigarettes. List all the arguments you can think of for and against such a law.

FOR	AGAINST

44/45

Self-Evaluation Answer Key

SELF-EVALUATION 1

1-1. a. About 37°C
b. About 36°C
c. 39°C
If you had trouble with this question, review pages 14 to 16 in *Well-Being*.

1-2. You should have included the following relationship in your answer: calories = mass (grams) X change in temperature (°C).
If you forgot the relationship, review **Excursion 1-1.**

1-3. 1,000 calories = 1 Calorie
See **Excursion 1-1** if you had difficulties.

1-4. 280 calories
Review **Excursion 1-1** if you missed this question. If you still cannot seem to understand how to get the answer, check with your teacher.

1-5. Your answer should have included these two ideas:
a. the number of Calories taken in
b. the number of Calories used
You should have mentioned that it is the number of Calories taken in and not just the amount of food you eat, because different foods contain different numbers of calories.

1-6. Vitamins and minerals
Problems with this? Review page 22, right at the end of the first chapter.

1-7. The boy is overweight for his age and size by 15 lb.
If you had difficulty with this, you should review **Excursion 1-4.**

1-8. a. Your answer should have indicated that it is a system in which a change in the input produces an opposite change in the output. You might have said instead that it is a system in which the response is opposite to the stimulus. See pages 9 and 10 if you had difficulties.
b. One of many examples possible is the heating or cooling system in your house. Another would be a driver in a car. In both cases a change in some variable (temperature or direction of motion) is detected by a detector (thermostat, driver) that causes a change in the system to compensate for the change detected (furnace goes on, driver turns steering wheel). Your example should be a system that contains those same parts.

46/47

1-9. Your design should include plans to do the following things:

1. Keep an accurate record of the rabbit's weight.
2. Keep track of all the food he consumes every day and find out how many Calories are in this food.
3. Keep the rabbit healthy by seeing that he gets the necessary vitamins and minerals.
4. Vary the Calorie intake of the rabbit each week until at a certain input level its body weight is maintained practically unchanged for an entire week.

If you had planned to use this procedure with several rabbits instead of with just one, you could have more confidence in your findings.

SELF-EVALUATION 2

2-1. a. Jar A was used as a control. In many experiments, what you are interested in is the difference between a control and an experimental group.

b. There is some evidence that points to the possibility that the solution of cigarette chemicals prevented the corn seeds from germinating. However, you can't be sure. There is the possibility that the seeds that were put in jar B would not have germinated even if they had been put in tap water. You would have to repeat this experiment several times before you could be certain that it is the cigarette chemicals in the solution that is preventing the seeds from germinating.

2-2. a. Goblet cells tend to enlarge and produce more mucus.

b. Ciliated cells become fewer and beat more slowly.

c. Air sacs are fewer and have thicker walls.

If you had difficulty answering these, review pages 31, 32 and 34.

2-3. This question probably made you think a bit. Lung cancer death rates and the number of cigarettes smoked have increased together. Even though there is strong evidence that there is an association between the increase in deaths from lung cancer and the number of cigarettes smoked, there is no evidence that one causes the other. If smoking causes cancer, then all smokers should get lung cancer unless they die accidentally while they are still young. There is, however, a great deal of evidence that the two things are related. But there is no evidence for a cause-and-effect relationship at the present time. You might want to look at the bar graph on page 40 again.

2-4. 1. Cigarettes
2. Cigars
3. Pipes

See page 44 if you had difficulties with this question.

2-5. a. Increased heartbeat rate for smokers

b. Increased breathing rate while resting for smokers

c. Increase in amount of CO in the exhaled air for smokers

See pages 35 and 45 if you found these questions difficult.

2-6. This was not an easy question to answer. You know that the fairly minor changes that are associated with smoking disappear when people stop smoking. Extra mucus stops being produced, the cilia beat faster, and the epithelium of the lungs gradually becomes thinner. Also, excess coughing seems to disappear. The data in Figure 2-16 indicates that stopping smoking even reduces the rate of death from lung cancer. You might also reread pages 46 and 47.

2-7. You probably thought about this question for a while. There are several possible answers. One main reason is that so far the evidence does not establish a cause-and-effect relation between smoking and cancer or other diseases. Another reason is that perhaps the law could not be enforced even if Congress did pass it. You will get a chance to examine this question in greater detail a bit later in this unit.

2-8. Well, what did you check on this one? The evidence that cigarette smoking is harmful appears to be conclusive and thus should be considered. However, you may have a different opinion. You might want to discuss your answer to this question with some of your classmates or your teacher.

SELF-EVALUATION 3

3-1. You should have indicated that a person is physically dependent on something if, when he suddenly stops using the substance, he gets a withdrawal illness.

If you had problems writing an operational definition for physical dependence, you should review pages 49 and 50.

3-2. A person is psychologically dependent on a substance if he has a strong desire for the substance even though his body does not need the substance.

If you had difficulty with this question, read over page 51.

3-3. A "cold turkey cure" is when a person suddenly stops using a substance and gets a withdrawal illness. A gradual tapering off is *not* a "cold turkey cure."

3-4. You could have listed a variety of symptoms such as twitching, cramps, loss of appetite, and nausea. Check your list against those given in Table 3-1 on page 50.

3-5. A chemical that is introduced into the body may block the messages that are being sent from dectector to controller in your body's negative feedback systems. Suppose a bright light were placed in front of your eye. Normally this would cause your "light stat" to send a message to the pupil of your eye to close down. It is possible that a chemical introduced into your body might stop this message from going through. This could seriously injure your eye, which would be receiving too much light.

See pages 52 to 54 for a more detailed explanation.

3-6. One of the things a pregnant woman should consider before taking any drug is what effect it will have on her unborn child. In Chapter 2, you learned that tobacco smoke can affect the baby of a pregnant woman. It is also known that if a pregnant woman takes certain drugs regularly, her unborn child may become physically dependent on these drugs. The baby can be born an addict. You may have read or heard about other cases where chemicals taken by an expectant mother have affected her unborn baby.

See page 51 for more information about this.

SELF-EVALUATION 4

4-1. Depressants are chemicals that slow the body down.

4-2. Alcohol enters the bloodstream faster because it does not have to be digested. It goes unchanged from the digestive system into the bloodstream.

Review the section "How's Your A.Q.?" on page 60 if you had difficulty with this question.

4-3. You may have mentioned several factors but the two main ones are the person's weight and whether the person is a new drinker or not. Other important factors include whether the person is drinking on an empty stomach or has just eaten and whether the person uses other drugs at the same time he is drinking.

If you had difficulty with this question, you should go over the sections "Variation of Effect," on page 64, and "It's Not So Simple," on page 65.

4-4. There are several medical uses of depressants. Your answer should have included two of these: to relax patients, to treat high blood pressure, to prevent epileptic seizures, to help people sleep, to relieve pain, and to reduce coughing. See Table 4-1 if you need help.

4-5. You may have had to think about this question for a minute. The reason is that dirty needles would tend to spread diseases from one person to another. The use of dirty needles is what causes people who inject chemicals into their body to get diseases such as hepatitis as well as infections that cause boils. Page 59 discusses this problem.

4-6. The data presented in Figure 4-2 on page 63 shows the relationship between the chance of having an accident and the blood-alcohol level. It indicates that the chance of having an accident increases very rapidly as the blood-alcohol level rises.

4-7. You should have indicated in your answer that one drug or chemical can cause your body to react differently to another drug. An example of this is the relationship between alcohol and carbon tetrachloride. Carbon tetrachloride has been used for years as a cleaning agent and was thought to be fairly harmless. However, if you have been drinking and then breathe in the fumes of carbon tetrachloride, you are very likely to have a severe case of kidney poisoning that may result in death. It is wise not to mix drugs even if it is "common knowledge" that they can't hurt you. Page 65 can help here.

4-8. This was a personal opinion question. In your answer you should have considered the possible harmful effects of depressants and what could possibly happen if they are readily available to all people. It is interesting that regulations as to the sale of these cough medicines vary from country to country. In the United States a prescription is required, while in Canada they are sold without a prescription although there is a legal limit on the codeine content.

4-9. a. Donald is probably kidding himself.

b. He is more than likely well on the way to becoming a drug addict. Even though he may want to quit, he may not be able to because the withdrawal illness would be too much for him to deal with.

c. The other dangers he faces include the possibility of hepatitis from dirty needles, infection, the danger of an overdose, etc.

SELF-EVALUATION 5

5-1. Stimulants are chemicals that speed up the body's activities.

5-2. There are several psychological effects of stimulants. Your answer should include two of these: nervousness, irritability, uninhibited behavior, confusion.

If you named other effects or you weren't able to think of any, check over the section on page 69.

5-3. A regular user of a drug may develop a tolerance for the drug. His body gets used to the chemical and no longer reacts in the same way. As this tolerance increases, the person requires larger and larger doses to get the same effect.

5-4. A hallucinogenic drug is one that affects the mind so that the world, as detected by the senses, is distorted. If you would like to find out more about hallucinogens, see **Excursion 5-1.**

5-5. We hope that you said No to this question. Stimulants do not get rid of tiredness. They just help the body use up its stored energy. However, this energy is limited and as a result a person may suddenly run out of energy without warning. This may occur just before or during the test, and as a result the student may find that he falls asleep during the test itself. The best idea seems to be to study well ahead of time so that you can get a good night's sleep on the night before the test. Try it—it really works!

5-6. Not very much is known about the physical changes that occur when one uses hallucinogenic drugs. In fact, the effects found so far do not always seem to be too serious. In some cases, such as with LSD, there is some evidence to indicate that there may be some chromosome damage. One thing that may point to a physical change occurring is the flashbacks that can occur after taking hallucinogens such as LSD. You must keep in mind that the lab tests of the drugs make use of very pure drugs. The drugs that are sold "on the street" may well not be pure. As a result, the other chemicals they contain may produce severe illness, such as that caused by taking LSD that has been mixed with strychnine, a deadly poison.

5-7. It is quite possible that the person has taken a depressant, for he is exhibiting many of the characteristics of an individual under the influence of a depressant. Refer back to Chapter 4 if you are not sure.

5-8. This is a question for which there is no right or wrong answer. You are asked to make a decision about how you would vote on the question of the legalization of marijuana and why. The most important thing to do in making your decision is to try to consider all the evidence and all the points of view before making up your mind. Voting for or against the use of marijuana should not be based on pure emotions. It should be based on evidence about the effects marijuana may have on people. Remember that a decision based on present evidence may not be valid in five years. Researchers may find more evidence one way or the other. You may want to talk this over with your classmates or even with your parents, asking them how they would vote and why.

SELF-EVALUATION 6

6-1. a. A double-blind experiment is one in which neither the doctor nor the patient knows whether the patient is receiving the treatment or placebo.

b. This method is necessary to counteract a human effect on both doctor and patient. If a person thinks something will have an effect on him, his belief may cause the effect to occur. And patients can sense whether or not the doctor expects an effect to occur. Experimenters have to be able to tell the difference between the change due to the treatment and the change due to the person's belief that there will be a change. (See page 86 for more information.)

6-2. Your answer should have included the two main reasons why laws are made:

a. To protect people from other people

b. To enforce some people's idea of what is morally correct

If you had difficulties with this question, read over the sections on pages 86 through 88.

6-3. Some laws are more difficult to enforce than others simply because people are not willing to abide by them. The reasons for not abiding by the law may be economic reasons, selfish reasons, and sometimes unknown reasons. If enough people do not obey a law, it becomes impossible to enforce. Under these conditions the law is often ineffective and must be repealed.

6-4. There were many people who continued to drink alcohol in spite of the laws against its consumption. These people were willing to accept the risks in drinking, and they felt that they had the right to make their own choice. Most people felt that it was unfair to impose the prohibition laws on everyone. If someone chose not to drink, that was fine, but why impose the moral judgments of these people on everyone. As more and more people refused to obey the laws, law officers found that the laws had become completely unenforceable.

6-5. There are many possible reasons you could have given. Some of the reasons are given below.

a. Many jobs depend on the alcohol industry, but very few depend on the sale or manufacture of illegal drugs.

b. The sale of alcohol provides the government with a great deal of tax revenue, but the sale of illegal drugs does not.

c. The use of alcohol is widespread, while the use of drugs is not nearly so widespread.

d. People are familiar with the use of alcohol and its resulting problems, but most people are hesitant about allowing the use of new and unfamiliar drugs.

e. Many people in important and powerful jobs use alcohol, but few are drug users.

6-6. Well, you may have listed many arguments for and against a law to outlaw the manufacture and sale of cigarettes. Compare your list with the lists of some of your classmates. You might want to discuss this with your classmates, your teacher, or your parents.

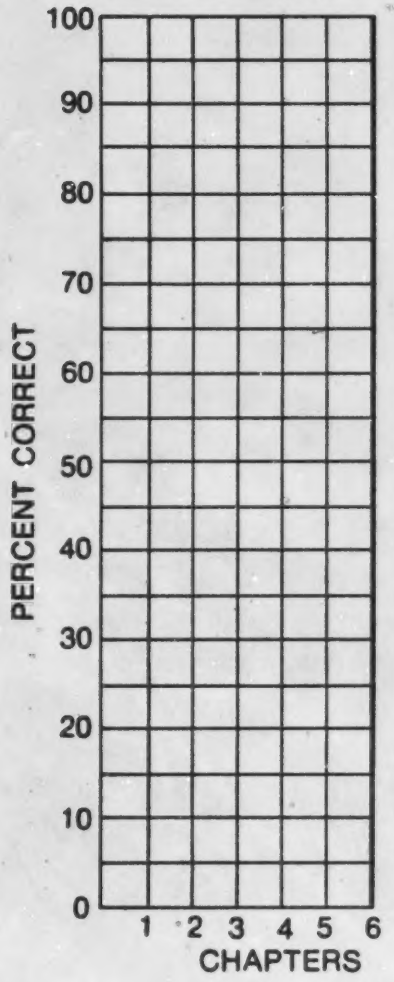
My Progress

Keep track of your progress in the course by plotting the percent correct for each Self-Evaluation as you complete it.

$$\text{Percent correct} = \frac{\text{Number correct}}{\text{Number of questions}} \times 100$$

To find how you are doing, draw lines connecting these points. After you've tested yourself on all chapters, you may want to draw a best-fit line. But in the meantime, unless you always get the same percent correct, your graph may go up and down like a series of mountain peaks.

RECORD OF MY PROGRESS



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